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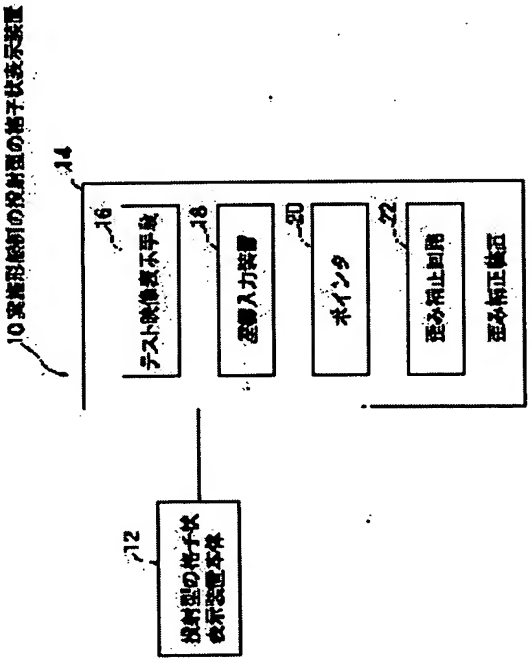
(54) PROJECTION TYPE GRID-SHAPED DISPLAY DEVICE, AND METHOD FOR CORRECTING DISTORTION OF PROJECTED VIDEO

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a projection type grid-shaped display device that can correct the distortion of a projected video caused when a video image is projected onto a screen while a projection optical axis is obliquely tilted.

SOLUTION: The projection type grid-shaped display device 10 has a device main body 12 and a distortion correction device 14. The distortion correction device 14 is provided with a test video display means 16, a coordinate entry device 18, a pointer 20 and a distortion correction circuit 22. The device main body projects the video displayed on a grid-shaped video display body onto a screen through a projection lens as a radiation projection light and the screen displays the projected vide. The distortion correction device corrects distortion in the projected video when the video is projected on the screen while the projection optical axis is obliquely projected. A test video means uses e.g. a rectangle image for a test video and allows the screen to display the test projection video. The coordinate entry device enters coordinates as four corners of a rectangle not distorted corresponding to coordinates at four corners of a distorted rectangle.



The pointer shifts the four corners of the distorted rectangle to the coordinates at the four corners of the rectangle not distorted. The distortion correction circuit corrects the distortion of the projected video on the basis of the relation between the coordinates at four corners of the distorted rectangle and the coordinates at four corners of the rectangle not distorted.

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CLAIMS

[Claim(s)]
[Claim 1] In the grid-like display of the projection mold which projects the image displayed on the grid-like graphic display object on a screen as radial incident light through a projector lens, and displays a projection image on a screen As a compensator which amends the projection distorsion of projected image when making an incident light shaft slanting and projecting it to a screen A means to make either of the regular polygons a test image, to project a test image on a screen, and to display a test projection image, The coordinate input unit which inputs the coordinate of a test image without the distortion corresponding to the coordinate of the specific location which specifies a test projection distorsion-of-projected-image profile, The pointer which moves the specific location which specifies a test projection distorsion-of-projected-image profile to the coordinate of a test image without distortion into which it was inputted with the coordinate input unit, The grid-like display of the projection mold characterized by having a distortion amendment means to amend projection distorsion of projected image, based on the relation between the coordinate of the specific location which specifies a test projection distorsion-of-projected-image profile, and the coordinate to which a test image without distortion corresponds.
[Claim 2] A means to display a test projection image projects the actual input image aiming at a projection display as a test projection image. A coordinate input unit The coordinate of an actual input image without the distortion corresponding to the coordinate of the specific location which specifies an actual input distorsion-of-projected-image profile is inputted. A pointer The specific location which specifies an actual input distorsion-of-projected-image profile is moved to the coordinate of an actual input image without distortion into which it was inputted with the coordinate input unit. A distortion amendment means The projection type according to claim 1 characterized by amending projection distorsion of projected image based on the relation between the coordinate of the specific location which specifies an actual input distorsion-of-projected-image profile, and the coordinate to which an actual input image without distortion corresponds of grid-like display.
[Claim 3] The image displayed on the grid-like graphic display object is projected on a screen as radial incident light through a projector lens. It is the projection distorsion-of-projected-image amendment approach which amends the projection distorsion of projected image when making an incident light shaft slanting and projecting it to a screen when displaying a projection image on a screen. The step which moves to the coordinate which specifies the test image which does not have distortion in the specific location which specifies the test projection distorsion-of-projected-image profile on which it was projected on the screen with a pointer, The step which computes a distortion amendment parameter from the relation between the coordinate of the specific location which specifies a test projection distorsion-of-projected-image profile, and the coordinate which specifies a test image without distortion, The projection distorsion-of-projected-image amendment approach characterized by having the step which amends a projection image according to a distortion amendment parameter.
[Claim 4] The step which moves to the coordinate which specifies the actual input image which does not have distortion in the specific location which specifies the actual input distorsion-of-projected-image profile on which the actual input image for the purpose of projection was projected as a test projection

image, and it was projected on the screen with a pointer, The step which computes a distortion amendment parameter from the relation between the coordinate of the specific location which specifies an actual input distorsion-of-projected-image profile, and the coordinate which specifies an actual input image without distortion, The projection distorsion-of-projected-image amendment approach according to claim 3 characterized by having the step which amends a projection image according to a distortion amendment parameter.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the grid-like display of the projection mold equipped with the device which amends the projection distorsion of projected image produced by slanting projection, and the approach of amending such projection image distortion, when the screen inclines to an incident-light shaft in more detail about the grid-like display of a projection mold, and the projection distorsion-of-projected-image amendment approach (i.e., when projecting an image from across to a screen).
[0002]
[Description of the Prior Art] The grid-like display of a projection mold displays an image on grid-like graphic display objects, such as a liquid crystal panel, and projected and shows it on the screen by making the image of a graphic display object into radial incident light through a projector lens. By the way, when displaying an image on a screen using the grid-like display of a projection mold, an incident light shaft is made to intersect perpendicularly to a screen, rather, an incident light shaft is leaned in the vertical direction to a screen, and an image is projected in many cases rather than it projects an image. And when an incident light shaft is leaned in the vertical direction and an image is displayed on a screen, a rectangular image is displayed as an image distorted to the trapezoid.
[0003] Then, in case it leans in the vertical direction to a screen and an image is projected, the amendment circuit which amends correctly the image to which the rectangle was distorted to the trapezoid in a rectangle is established in the grid-like display of the conventional projection mold. The conventional amendment circuit consisted of an amendment means at the time of leaning an incident light shaft upwards, and a 2-way amendment means with the amendment means at the time of leaning an incident light shaft downward, when the user of the grid-like indicating equipment of a projection mold operates the body carbon button or remote control equipment of a grid-like indicating equipment of a projection mold, operated the amendment circuit and has usually amended distortion.
[0004] By the way, when projecting from the screen front, in order to avoid the location in which an observer is present, to install the grid-like display of a projection mold or to install carefully as [so that the grid-like display of a projection mold may be installed between an observer and a screen and an observer's field of view may not be interrupted], usually the installation of the grid-like display of a projection mold to a screen is restrained. Therefore, an incident light shaft is made slanting to a screen, and an image is projected more often from across. If an incident light shaft is made slanting to a screen and an image is displayed on a screen, as shown in drawing 6 , a rectangular graphic form image will be distorted to an abbreviation rhombus. By drawing 6 , a projector means the grid-like display of a projection mold. The following is also at this appearance.
[0005]
[Problem(s) to be Solved by the Invention] However, although it was able to be coped with by the amendment circuit of the conventional 2-way amendment and distorsion of projected image was fully able to be amended when the incident light shaft of the grid-like display of a projection mold was leaned

and projected only in the vertical direction to a screen When graphic display of the incident light shaft of the grid-like display of a projection mold is carried out and carried out in the direction of slant to a screen, distorsion of projected image cannot be amended in the amendment circuit of the conventional 2-way amendment. Moreover, when a projector is projected in the direction of slant to a screen, it is not easy for a user without a know how to amend a distortion image.

[0006] Then, the purpose of this invention is offering the grid-like display of the projection mold equipped with a means amending the projection distorsion of projected image when making an incident light shaft incline aslant to a screen, and projecting an image.

[0007]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the grid-like display of the projection mold concerning this invention In the grid-like display of the projection mold which projects the image displayed on the grid-like graphic display object on a screen as radial incident light through a projector lens, and displays a projection image on a screen As a compensator which amends the projection distorsion of projected image when making an incident light shaft slanting and projecting it to a screen A means to make either of the regular polygons a test image, to project a test image on a screen, and to display a test projection image, The coordinate input unit which inputs the coordinate of a test image without the distortion corresponding to the coordinate of the specific location which specifies a test projection distorsion-of-projected-image profile, The pointer which moves the specific location which specifies a test projection distorsion-of-projected-image profile to the coordinate of a test image without distortion into which it was inputted with the coordinate input unit, It is characterized by having a distortion amendment means to amend projection distorsion of projected image, based on the relation between the coordinate of the specific location which specifies a test projection distorsion-of-projected-image profile, and the coordinate to which a test image without distortion corresponds.

[0008] The graphic form which has the clear geometric relation to the coordinates which specify the profile of a graphic form in this invention, for example, a rectangle, is projected as a test image, the coordinate relation between a distortion projection image and the projection image which is not distorted is set up, and the projection image which a distortion amendment means carries out distortion amendment of the actual future projection images, and does not have distortion is generated according to the coordinate relation. A rectangle is used for a test image. A coordinate input unit is a mouse. As a test image, the actual input image for the purpose of a display can also be used. In that case, a means to display a test projection image The actual input image aiming at a projection display is projected as a test projection image. A coordinate input unit The coordinate of an actual input image without the distortion corresponding to the coordinate of the specific location which specifies an actual input distorsion-of-projected-image profile is inputted. A pointer The specific location which specifies an actual input distorsion-of-projected-image profile is moved to the coordinate of an actual input image without distortion into which it was inputted with the coordinate input unit. A distortion amendment means Projection distorsion of projected image is amended based on the relation between the coordinate of the specific location which specifies an actual input distorsion-of-projected-image profile, and the coordinate to which an actual input image without distortion corresponds.

[0009] The projection distorsion-of-projected-image amendment approach concerning this invention the image displayed on the grid-like graphic display object When it projects on a screen as radial incident light through a projector lens and a projection image is displayed on a screen, It is the projection distorsion-of-projected-image amendment approach which amends the projection distorsion of projected image when making an incident light shaft slanting and projecting it to a screen. The step which moves to the coordinate which specifies the test image which does not have distortion in the specific location which specifies the test projection distorsion-of-projected-image profile on which it was projected on the screen with a pointer, It is characterized by having the step which computes a distortion amendment parameter, and the step which amends a projection image according to a distortion amendment parameter from the relation between the coordinate of the specific location which specifies a test projection distorsion-of-projected-image profile, and the coordinate which specifies a test image without distortion.

[0010] As a test image, the actual input image for the purpose of a display can also be used. In that case, the actual input image for the purpose of projection is projected as a test projection image. The step which moves to the coordinate which specifies the actual input image which does not have distortion in the specific location which specifies the actual input distorsion-of-projected-image profile on which it was projected on the screen with a pointer, It has the step which computes a distortion amendment parameter, and the step which amends a projection image according to a distortion amendment parameter from the relation between the coordinate of the specific location which specifies an actual input distorsion-of-projected-image profile, and the coordinate which specifies an actual input image without distortion.

[0011]

[Embodiment of the Invention] With reference to an accompanying drawing, the example of an operation gestalt is given to below, and the gestalt of operation of this invention is explained to it at concrete and a detail.

The example of the example book operation gestalt of an operation gestalt of the grid-like display of a projection mold is an example of the operation gestalt of the grid-like display of the projection mold concerning this invention, and drawing 1 is the block diagram showing the configuration of the grid-like display of the projection mold of this example of an operation gestalt. The grid-like display 10 of the projection mold of this example of an operation gestalt consists of distortion compensators 14 attached to the body 12 of a grid-like display of a projection mold, and the body 12 of a grid-like display of a projection mold, as shown in drawing 1 . The distortion compensator 14 is equipped with a test graphic display means 16 to display a test projection image, the coordinate input unit 18, the pointer 20, and the distortion amendment circuit 22.

[0012] The body 12 of a grid-like display of a projection mold projects the image displayed on the grid-like graphic display object on a screen as radial incident light through a projector lens, and displays a projection image on a screen. The distortion compensator 14 is equipment which amends the projection distorsion of projected image when making an incident light shaft slanting and projecting it to a screen.

[0013] The test image means 16 makes a test image either of the graphic forms with the clear geometric relation to the coordinates which specify the profile of a graphic form, i.e., a regular polygon, for example, a rectangle, projects a test image on a screen, and displays a test projection image. The coordinate input units 18 are input units, such as a mouse, and input the coordinate of four corners of the rectangle corresponding to the coordinate of the specific location which specifies a test projection distorsion-of-projected-image profile, for example, the perverted coordinate of four rectangular corners, which is not distorted. A pointer 20 moves to the coordinate of four corners of the rectangle into which four corners of the bent rectangle were inputted and which is not distorted. The distortion amendment circuit 22 amends projection distorsion of projected image based on the relation between the coordinate of four corners of the bent rectangle, and the coordinate of four corners of the rectangle which is not distorted.

[0014] With reference to drawing 4 , the operation of the distortion compensator 14 of the grid-like display 10 of the projection mold of this example of an operation gestalt is explained from drawing 2 . Drawing 2 to drawing 4 is drawing showing the configuration of the projection image for every phase at the time of carrying out projection distorsion-of-projected-image amendment which projected the image using the grid-like display of the projection mold of this example of an operation gestalt, respectively. In this example of an operation gestalt, the direction of slant of the incident light shaft is first carried out to a screen with the test image means 16 built in the projector, a rectangular image is projected on a screen, and as shown in drawing 2 , the test projection image 30 of the bent rectangle is acquired. Subsequently, the coordinate input units 18, such as a mouse, are used, and as shown in drawing 3 , according to a screen frame, specifying [coordinate] point 32 A-D of four points is specified in the test projection image 30. The distortion amendment circuit 22 calculates and sets up a distortion amendment parameter from the coordinate data of four-point 32 A-D. Henceforth, based on the set-up distortion amendment parameter, the distortion amendment circuit 22 amends a distortion projection image, and as shown in drawing 4 , it makes it the projection image 34 without distortion. As a test image, the actual input

image aiming at a projection display can also be used.
[0015] The example of the example book operation gestalt of an operation gestalt of the projection distorsion-of-projected-image amendment approach is an example of the operation gestalt of the projection distorsion-of-projected-image amendment approach concerning this invention, and drawing 5 is a flow chart which shows the procedure of the projection distorsion-of-projected-image amendment approach of this example of an operation gestalt. In case the projection distorsion-of-projected-image amendment approach of this example of an operation gestalt projects the image displayed on the grid-like graphic display object on a screen as radial incident light through a projector lens and displays a projection image on a screen, it is the approach of amending the projection distorsion of projected image when making an incident light shaft slanting and projecting it to a screen. As shown in drawing 5 , it is the 1st step S1 first. It is a pointer in the coordinate which specifies the profile without distortion corresponding to four corners of the specific location which specifies the test projection distorsion-of-projected-image profile on which it was projected on the screen, for example, the bent rectangle, for example, the coordinate of four corners of a rectangle without distortion, and ******. That is, it is
[0016] by performing actuation for which the directions coordinate directed with the pointer is moved to the coordinate inputted into the coordinate input unit two or more times. Subsequently, the 2nd step S2 The distortion amendment circuit 22 (drawing 5 indicates CPU) calculates and sets up a distortion amendment parameter based on the coordinate of four points. The 3rd step S3 The amendment parameter which made the distortion amendment circuit 22 compute then is written in storage and Amendment LSI. Amendment LSI displays the projection image which amends a distortion projection image and is not distorted according to the written-in amendment parameter.
[0017] Moreover, the approach of choosing first which point being adjusted from four points, and acquiring coordinate information from a coordinate input unit after that in addition to the approach of moving the pointer shown above and determining a location may be used for a coordinate input. An amendment result is reflected in real time by the image by using this approach and always processing coordinate information. As a test image, the actual input image aiming at a projection display can also be used.
[0018]
[Effect of the Invention] A means according to this invention to make either of the regular polygons a test image, to project a test image on a screen, and to display a test projection image, The coordinate input unit which inputs the coordinate of the test image corresponding to the specific coordinate of a test projection image, The grid-like display of a projection mold is equipped with a distortion amendment means to amend projection distorsion of projected image, based on the relation between the pointer which moves the specific location of a test projection image to the coordinate (coordinate of the image which is not distorted) of normal, the specific coordinate of a test projection image, and the coordinate of normal. Thereby, the projection distorsion of projected image when making an incident light shaft slanting and projecting it to a screen, can be amended easily. Moreover, according to this invention approach, the approach of amending simply the projection distorsion of projected image when making an incident light shaft slanting and projecting it to a screen, is realized.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing the configuration of the grid-like indicating equipment of the projection mold of the example of an operation gestalt.
[Drawing 2] It is drawing showing the configuration of the distortion projection image at the time of carrying out projection distorsion-of-projected-image amendment where the image was projected using the grid-like display of the projection mold of the example of an operation gestalt.
[Drawing 3] It is drawing showing the point specifying [coordinate].
[Drawing 4] It is drawing showing the projection image by which distortion amendment was carried out.

[Drawing 5] It is a flow chart explaining the procedure of the projection distorsion-of-projected-image amendment approach of the example of an operation gestalt.
[Drawing 6] It is drawing showing a projection image with distortion.
[Description of Notations]
10 Grid-like Display of Projection Mold of Example of Operation Gestalt
12 Body of Grid-like Display of Projection Mold
14 Distortion Compensator
16 Test Graphic Display Means
18 Coordinate Input Unit
20 Pointer
22 Distortion Amendment Circuit
30 Test Projection Image of Bent Rectangle
32 Four Points Specifying [Coordinate]
34 Projection Image without Distortion

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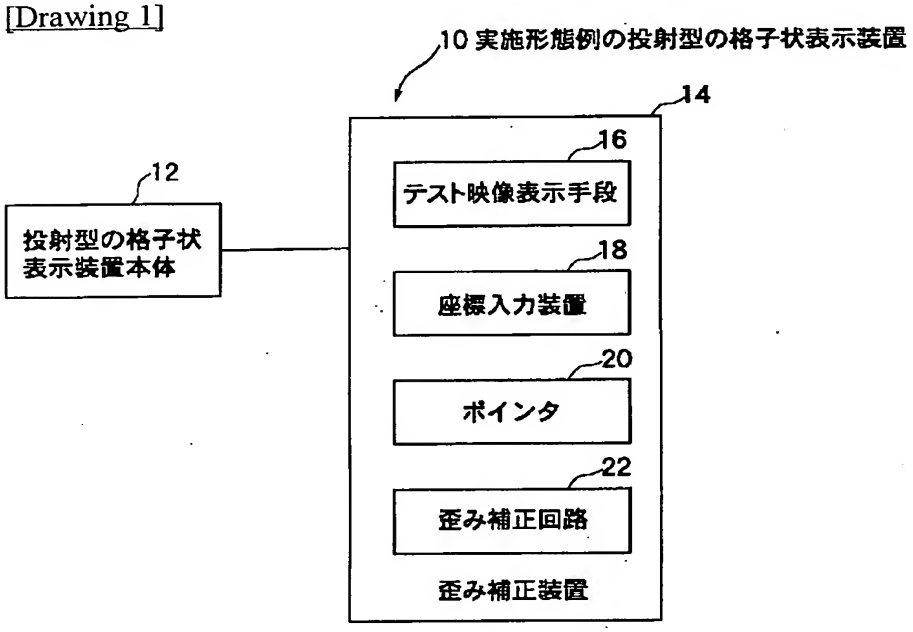
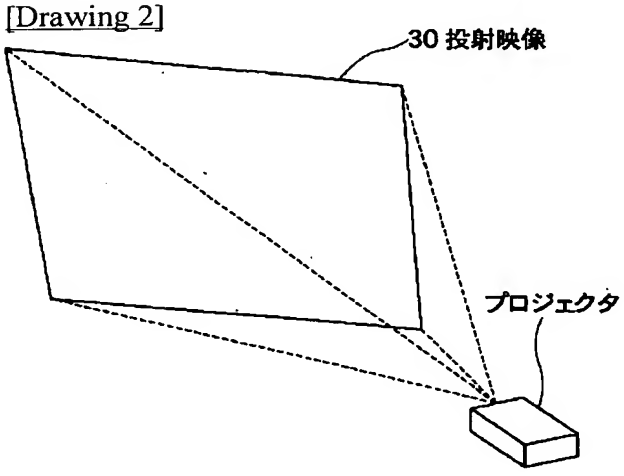
DRAWINGS

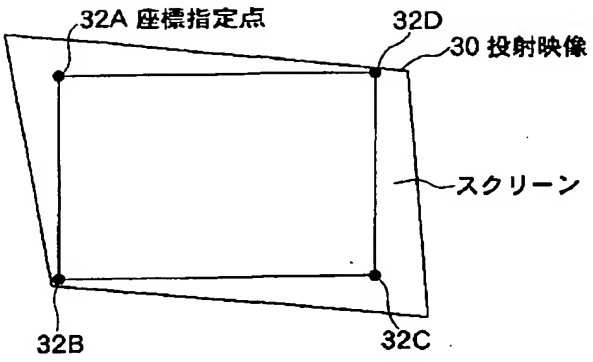
[Drawing 1]



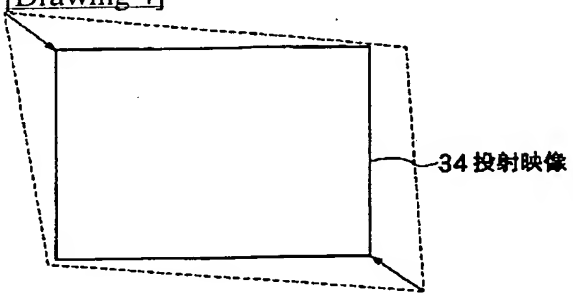
[Drawing 2]



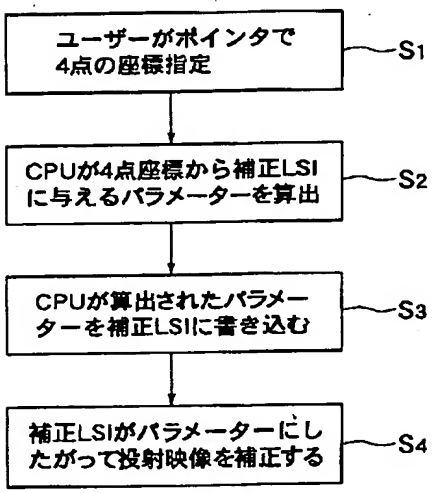
[Drawing 3]



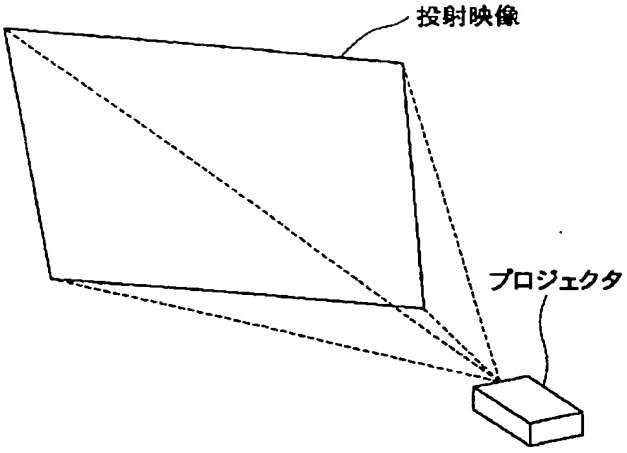
[Drawing 4]



[Drawing 5]



[Drawing 6]



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